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Anaesthetic management of patients with phaeochromocytoma and uncontrolled blood pressure

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CASE REPORT

ANAESTHETIC MANAGEMENT OF A PATIENT WITH PHAEOCHROMOCYTOMA AND UNCONTROLLED BLOOD PRESSURE

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ABSTRACT: Anaesthetic management of phaeochromocytoma includes pre-operative preparation, intraoperative control and avoidance of drugs that cause hypotension or hypertension. A case of 46-year old male, with phaeochromocytoma is presented here highlighting issues in anaesthetic management.

KEY WORDS: Pheochromocytoma Preanaesthetic Medication Hypertension

INTRODUCTION

Phaeochromocytomas are rare catecholamine secreting tumours of the adrenal medulla[1]. The incidence varies from 0.1% to 0.8% in the hypertensive population[2]. Majority of these tumours (85-90%) are located on adrenal gland. Approxi-mately 10% of adult patients and 25% of paediatric patients have bilateral tumours. Almost 90% of the tumours are found in the abdomen. Remaining 5% are found any-where along the sympathetic tissue from the neck to the inguinal ligament. Biochemical tests and noninvasive localis-ing methods are essential for the definite diagnosis of phaeochromocytoma. Surgical removal of the tumour is the only definite therapy with low morbidity and mortality. The initial successful operations for the removal of phaeochromo-cytoma were performed by Cesar Roux and CH Mayo, in 1926[3,4].

In this report we describe a successful anaesthetic manage-ment of a patient with phaeochromocytoma.

CASE REPORT

A 46 years old male, diagnosed case of phaeochromocytoma with paroxysmal hypertension, was admitted to control his recent symptom of breathlessness. He is an insulin dependent diebetic, and a heavy smoker. He also had one episode of chest pain, which radiated to the left arm, about 6 months ago.

On examination there were bilateral rhonchi and tenderness in both hypochondriac regions. Electrocardiogram had evi-dence of antero septal infarct. Ultrasound abdomen showed a non-visible left kidney and hypertrophied right kidney with a 4 x 4.5 cm mass at the upper pole. CT abdomen showed right adrenal mass with absent left kidney and a right sided pleural effusion.

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The urinary catecholamines were 2256 mg/24 hours (range 10-270), urine VMA was 4340mg/24 hours (range 1.9-9.8), serum cortisol was 23.9 (3.25) and S.DHEA SO4 was 35.8 (range 80-560).

Echocardiography showed left ventricular hypertrophy, severe left ventricular dysfunction with ejection fraction of 16%. The septum and the apex of the heart were dyskinetic. The coronary angiography revealed single vessel disease involving left circumflex artery. The patient was discharged home after the control of symptoms.

The patient had a regular follow up, and repeat investiga-tions after one month of treatment showed an ejection frac-tion of 43%. Moderate fluctuations in the control of blood pressure were observed and patient was admitted to the intensive care unit for further management of fluctuating blood pressure prior to the surgical removal of the tumour. Preoperatively, most of the symptoms had ameliorated. Ortho-static hypotension was within the recommended range of 80/45mm Hg, although there were episodes of fluc-tuating blood pressure. The physician incharge of the case suggested to go ahead with surgery as further control of blood pressure was not possible.

On the morning of surgery, the patient was premedicated with morphine 10mg intramuscular, midazolam 7.5 mg orally alongwith his antihypertensive medications. This resulted in a drop of blood pressure to 80/50 mmHg. Following a fluid bolus of 500 ml, the B.P. came up to 90/60 mmHg. Patient was shifted to O.R. for monitoring. Arterial line was estab-lished in the left radial artery, for invasive blood pressure monitoring. Blood pressure ranged between 85-95/55-60 mmHg. A 1000 ml of fluid was infused, that resulted in blood pressure of 100/60 mmHg but patient developed tachycardia, with a heart rate of 120-130/min. A swan ganz catheter was inserted at this stage. Initial central venous pressure was 3 cm of water, for which 2.5L fluid was given and central venous pressure came upto 6 cm of water, cardiac out put was 6.5 L and systemic vascular resistance was 550.

Nordarenaline infusion at the rate of 0.02 ug/kg/min was

started to improve the systemic vascular resistance and thereafter blood pressure rose to 120-130/65-75, heart rate 90/min, central venous pressure came upto 10 cm of water, cardiac out put was 10L/min and the systemic vascular resistance was 650. The Noradrenaline infusion was stopped before induction.

Induction of anaestheia was carried out with midazolam, thiopentone, vecuronium, and maintained on isoflurane, vecuronium and morphine. Intra operatively patient remained stable until the manipulation of tumour when the B.P. shot up from 120/70 to 200-300/100-160 mm of Hg. sodium nitroprusside (0.3-6ug/kg/min) infusion was started to control the blood pressure. At time boluses of 50-100ug were given. With this treatment blood pressure remained fluctuating between 250/120 to 130/75mmHg.

The resection time was 75 minutes. Following resection of the tumor the blood pressure dropped to 90/60 mm Hg. Nor adrenaline infusion was restarted at 0.04-0.1ug/kg/min and when the blood pressure reached the base line, dose was decreased to 0.02ug/kg/min.

After completion of surgery, the patient was extubated and shifted to the ICU with noradrenaline infused at a rate of 0.03-0.1ug/kg/min. The patient had one episode of hypotension during the 1st 24 hours, which was corrected by increasing noradrenaline infusion. The patient remained stable during the 2nd and 3rd post-operative day. On the 3rd post-operative day noradrenaline infusion was discontinued. The heamodynamic parameters of the patient at this stage were as follows, blood pressure of 130/70, cardiac index was 3.5, systemic vascular resistance was 925 Dynes/sec/cm^5, central venous pressure 10 cm water, PAP 25/15 swan ganz catheter and arterial line were removed at this stage, patient shifted out of the ICU the following day.

Discussion

Phaeochromocytoma is rare catecholamine secreting tumour. Due to continuous or phasic secretion of catecholamine from the tumour, patients present with hypertensive crisis, episodic or sustained hypertension or arrhythmia[5]. Surgical removal of identified lesions should be performed under controlled conditions and after sufficient preparation of the patient.

Our patient was managed pre-operatively with Terazocin, Tenormin and Ranitec. Terazocin was selected for our patient, because of ischaemic heart disease along with phaeochromocytoma. Terazocin in a dose ranging from 1-20mg/day is as effective as Prazocin, as it selectively blocks postsynaptic - alpha 1 receptors, it does not produce reflex tachycardia and has a shorter duration of action, thereby permitting more rapid adjustment of dosage and decreasing the duration of post-operative hypotension. Beta blockade for the control of preoperative hypertension is only recommended, once the alpha 1 adrenergic blockade has been effectively achieved or in patients with persistent tachycardia or arrhythmias. Other agents recommended for the control preoperative hypertension are calcium channel blockers[6]. These agents reduces blood pressure by inhibiting norepinephrine mediated transmembrane calcium influx in vascular smooth muscle and not by decreasing catecholamines synthesis in tumours[7]. The main advantage of these agents is that they do not produce over shoot hypotension or orthostatic hypotension and can be safely used in normotensive patients who have occasional episodes of paroxysmal hypertension.

The proposed criteria for adequate preoperative preparation is to achieve a supine arterial pressure[8] not greater than 160/90 mmHg, orthostatic hypotension not exceeding 80/45 mmHg, electrocardiogram free of ST-segments or T warve changes for atleast 2 weeks and no more than one premature ventricular contraction every 5 minutes. We did try to follow this criteria but the control of blood pressure was difficult even after maximum doses of antihypertensive drug, after admission in ICU. As the physician incharge of the case insisted that further control of blood pressure was not possible, therefore, the patient was scheduled for surgery. The importance of adequate volume expansion and proper blood pressure control was further highlighted by the fact that our patient did drop his blood pressure on the morning of surgery after receiving premedication and antihypertensive drugs. This hypotensive episode was treated with non-adrenaline as 2 L of rapid fluid infusion failed to improve the blood pressure. This hypotensive episode before induction was treated by using swan ganz catheter for haemodynamic monitoring. We had to use noradrenaline in our patient, as even 2 L of fluid transfusion did not bring the blood pressure up. We therefore, recommend that it is beneficial to have an invasive arterial pressure monitoring and a PA catheter in place in all such patients before induction to control any haemodynamic instability during induction, maintenance or following removal of the tumour.

Our patient did have a hypertensive crisis during surgical manipulation of the tumour and this was controlled with the use of sodium nitropruside and increasing the Isoflurane to 3%. Hypertension during manipulation of the tumor is due to the release of catecholamine and it is treated by nitropruside infusion in a dose of 0.5-1ug/kg/min. Nitroprusside is a direct acting arteriolar dilating agent with a rapid onset and short duration of action and therefore is helpful in cases like these where there is a wide and rapid fluctuation in the blood pressure. Our patient required much larger doses of sodium nitroprusside to control his blood pressure intra-operatively.

This patient also had an episode of hypotension on removal of the tumour, which was controlled by noradrenaline infusion at the rate of 0.04-0.1 ug/kg/min. This was continued until the 3rd post-operative day. If the hypotension is persistent then one should rule out hypovolaemia, sudden haemorrhage or residual effects of preoperative alpha 1 adrenergic blockade. Therefore we recommend initially giving large volumes of I/V fluids and only then using noradrenaline infusion in such cases.

In conclusion, management of patients with phaeochromocytoma should focus on the better understanding of pathophysiology of phaeochromocytoma, better preoperative preparation and intraoperative control, and avoidance of drugs that causes hypotension or hypertension, use of invasive haemodynamic monitoring and prompt treatment of hypertensive and hypotensive episodes as and when they occur.

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